

Patent
Docket No. 99143TO THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is a patent application under 37 CFR 1.53(b):

INVENTOR(S): Yoshinori SHIBATA; Junichi MASUDATITLE: BATTERY POWERED TABLE SAWS

 This application is being filed without the declaration of the
inventor(s). Inventor information is as follows:

 This is a continuing application of prior Application No. /
 Continuation
 Divisional
 Continuation-in-part

Enclosed are:

 X Specification
 X 11 Sheets of drawings
 X Oath or Declaration signed by the inventor(s)
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 PLEASE DELETE the following inventor(s) named in the prior
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accompanying application and is hereby incorporated by reference
therein

 Microfiche Computer Program
 Nucleotide and/or Amino Acid Sequence Submission

 X Assignment to Makita Corporation

 Certified copy of

 X Convention priority is claimed based on Japanese Application No.
10-194448, filed July 9, 1998.

 English Translation Document

 Small entity declaration(s)

 Preliminary Amendment

 X Information Disclosure Statement

66/60/10
1c535 U.S. PTO
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				(Small Entity)	(Large Entity)
BASIC FEE				\$380	\$760
Total Claims	16	- 20 =	x \$ 9 =		x \$ 18 =
Indep. Claims	1	- 3 =	x \$ 39 =		x \$ 78 =
Multiple Dependent Claims Presented				+ \$130 =	+ \$260 =
TOTAL				\$	\$760.00

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Field of the Invention

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Known motor driven saws, excluding permanently installed floor models, are generally classified as either portable saws or table saws. Portable saws are generally adapted to rest on and move along a workpiece so as to cut the workpiece. Table saws have a table for placing a workpiece thereon and have a saw unit vertically movably supported on the table, which saw unit can be moved downward toward the workpiece on the table so as to cut the workpiece.

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from the table saw be connected to an outlet by means of a plug. As a result, the table saw can not be used in places in which no outlets are present. For this reason, the operator is limited in the places in which cutting operations can be performed using such AC powered table saws.

5 SUMMARY OF THE INVENTION

It is, accordingly, one object of the present invention to teach battery powered table saws.

Preferably, a table saw is taught which can increase the number and type of locations in which table saws can be used. In one representative aspect, a battery driven motor is provided on a saw unit, and a battery mounting device is provided on the table saw at an appropriate position. Therefore, the table saw can be used in places that do not have a commercial power source. In addition, the operator is not required to utilize a cumbersome generator. As a result, highly useful and versatile table saws are taught.

Preferably, a battery mounting device is utilized to mount the battery on the table saw and the position of the battery mounting device may be advantageously chosen to provide additional useful features. For example, the battery mounting device may be positioned adjacent to a switch for starting the motor, so that wiring between the battery and the switch can be shortened and simplified. Alternatively, the battery mounting device may be positioned such that the battery serves as a counterweight against the weight of the motor or

the saw unit or may serve as a balance weight for the entire table saw unit.

Other objects, features and advantages of the present invention will be readily understood after reading the following detailed description together with the accompanying drawings and the claims.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a first representative embodiment of a table saw wherein the saw unit is in the uppermost position;

FIG. 2 is a side view of a second representative embodiment of a table saw wherein the saw unit is in the lowermost position;

FIG. 3 is a side view of a third representative embodiment of a table saw wherein the saw unit is in the uppermost position;

FIG. 4 is a plan view of the third representative embodiment, wherein the saw unit has been omitted;

FIG. 5 is a side view of a fourth representative embodiment of a table saw wherein the saw unit is in the uppermost position;

FIG. 6 is a side view of the fourth representative embodiment of a table saw wherein the saw unit is in the lowermost position;

FIG. 7 is a plan view of the fourth representative embodiment;

FIG. 8 is a side view of a fifth representative embodiment of a table saw wherein the saw unit in the uppermost position;

FIG. 9 is a plan view of the fifth representative embodiment;

FIG. 10 is a side view of a sixth representative embodiment of a table saw wherein
5 the saw unit in the uppermost position; and

FIG. 11 is a plan view of a saw unit of the sixth representative embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Preferably, a table saw includes a table for placing a workpiece thereon. A saw unit may be vertically and movably supported on the table and may have a saw blade mounted thereon. A battery-driven motor may be mounted on the saw unit for rotatably driving the saw blade and a battery mounting device may be provided to mount a battery on the table saw. Using this design, the battery powered table saw can be used in places that are far away from commercial power source outlets and the need for generators is eliminated.

15 In a first representative embodiment, the battery powered table saw has a handle and the battery mounting device is disposed on the handle. Preferably, the battery powered table saw includes a battery case for accommodating the battery, which battery case has an opening formed therein to permit foreign particles that may enter the battery case to be exhausted. The handle may have a switch mounted thereon and may be operable by the operator to start the

Variable	Mean	Standard deviation	Minimum	Maximum
Age	34.5	10.5	20	55
Gender	0.5	0.5	0	1
Marital status	0.5	0.5	0	1
Education	12.5	1.5	10	15
Income	15.5	5.5	10	25
Occupation	1.5	1.5	0	3
Health status	1.5	1.5	0	3
Life satisfaction	4.5	1.5	1	7
Subjective health	4.5	1.5	1	7
Physical health	4.5	1.5	1	7
Mental health	4.5	1.5	1	7
Life satisfaction	4.5	1.5	1	7
Subjective health	4.5	1.5	1	7
Physical health	4.5	1.5	1	7
Mental health	4.5	1.5	1	7

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workpiece on the table 3.

A pivotal support 5 may be fixedly mounted on a peripheral portion of the rear side of the table 3 (right side as viewed in FIG. 1). A pivotal arm 6 may be mounted on the pivotal support 5, so that the lateral pivotal arm 6 can be pivoted laterally (in a direction perpendicular to the vertical plane of FIG. 1) relative to the table 3. A saw unit 10 may be vertically pivotally mounted on an upper end of the pivotal arm 6 by means of a pivot pin 7.

The saw unit 10 may include a blade case 11 and a DC motor 12 mounted on one lateral side of the blade case 11. The DC motor 12 may have an output shaft (not shown), on which a saw blade 13 is mounted, so that the DC motor 12 can rotatably drive the saw blade 13. The blade case 11 preferably covers substantially half of the saw blade 13. A blade cover 14 may be movably mounted on the blade case 11 to cover and uncover the exposed half portion of the saw blade 13. More specifically, the blade cover 14 may be rotatably mounted on the blade case around the rotational axis of the saw blade 13 by means of a link mechanism 15 connected between the pivotal arm 6 and the blade case 11, so that the blade cover 14 can rotate in response to the vertical pivotal movement of the saw unit 10. Thus, when the saw unit 10 pivots downward, the blade cover 14 rotates in a direction to uncover the saw blade 13. As a result, the saw blade 13 may cut the workpiece placed on the table 3. On the other hand, when the saw unit 10 pivots upward, the blade cover 14 rotates in a direction to cover the saw blade 13.

The DC motor 12 may be selected from the known types of DC motor that are commercially available. Preferably, the DC motor rotates at a speed of about 2,000 rpm and is driven by an 18 volt DC power supply.

Preferably, the table 3 can rotate in opposite directions from a reference position within a predetermined angle. Thus, in the reference position, the saw blade 13 extends within a plane that is perpendicular to the diametrical direction of the table 3 across the auxiliary tables 2a, and the pivotal support 5 is positioned in the rearmost position (rightmost position as viewed in FIG. 1).

Although not shown in FIG. 1, a compression coil spring may be interposed between the blade case 11 and the pivot arm 6 so as to normally bias the saw unit 10 upward. Thus, the operator will be required to press the saw unit 10 downward against the biasing force of the coil spring in order to perform the cutting operation.

A handle 16 may be mounted on a housing of the motor 12 so as to extend outward from the housing. A switch 17 may be mounted on the handle 16 and may be operable by the operator to start and stop the motor 12. A lock button 18 also may be mounted on the handle 16 and may be operable by the operator to lock the switch 17 in the "ON" position. A battery case 21 may be integrally formed with the handle 16 and may be disposed on the rear side (right side as viewed in FIG. 1) of the handle 16. A battery 20 may be mounted within the battery case 21 and may serve as a power source for driving the motor 12. The battery 20 may

(one shown in FIG. 1) that are mounted on the bottom of the battery case 21 and extend into the interior of the battery case 21 for connection to the battery 20. The terminals 21b are connected to a motor drive circuit including the motor 20 and the switch 17, so that the motor 12 can start to rotate the saw blade 13 when the operator turns on the switch 17. A discharge opening 21a may be formed in the battery case 21 adjacent to the bottom of the battery case 21, so that any foreign particles that have entered the battery case 21 can be exhausted to the outside. Of course, the foreign particles also may be exhausted through the open end of the battery case 21 when the lid 22 is opened.

According to the representative embodiment shown in FIG. 1, the motor 12 can be driven by the power supplied from the battery 20. Therefore, the table saw 1 can be used even in places in which AC power source outlets are not conveniently located. Thus, the operator is not restricted in his or her use of the battery powered table saw.

In addition, because the battery casing 21 is formed on the handle 16, the battery 20 may be positioned adjacent to the motor 12 and the switch 17. Therefore, the wiring length between the terminals 21b and the motor 12 can be shortened, and the wiring operation can be simplified.

Further, by closing the battery casing 21 with the lid 22, foreign particles, such as cutting chips, may be prevented from entering the battery casing 21. Therefore, problems, such as improper mounting of the battery 20 and improper conductive condition of the motor

Because the battery casing 34 is located at the front portion of the handle 31, the battery 31 may be positioned to closer to the switch 17. Therefore, the wiring operation can be further simplified.

A third representative embodiment of a table saw will now be described with reference to FIGS. 3 and 4, in which a battery 40 can be mounted on a base 41 that rotatably supports the table 3. More specifically, the battery 40 may be mounted on the front side (right side as viewed in FIGS. 3 and 4) of one of a pair of auxiliary tables 41a, which is positioned on the lower side as viewed in FIG. 4 or is positioned on one lateral side opposite to the motor 12 (not shown in FIGS. 3 and 4).

Thus, a battery case 41b is mounted within the front portion of the auxiliary table 41a disposed on the lower side as viewed in FIG. 4. A battery 40 may be inserted into and removed from the battery case 41b for charging. As in the first and second representative embodiments, the battery 40 may have a pair of spring-biased push buttons 40a on opposite sides thereof, so that the battery 40 can be removably held in position relative to the battery case 41b.

Also, positive and negative power source terminals 41c may be mounted on the bottom of the battery case 41b and may be connected to a motor drive circuit including the motor 12 (not shown in FIGS. 3 and 4) and a switch 47a that may be mounted on a handle 47 of a saw unit 46.

can be the same as the saw unit 46 of the third representative embodiment.

By virtue of the arrangement of the battery case 53 adjacent to the pivotal axis 7 of the saw unit 55, the vertical pivotal operation of the saw unit 55 may be improved. Thus, when the saw unit 55 is in the uppermost position, the center of gravity G of the battery 52 is
5 outside of the vertical plane V as shown in FIG. 5, so that the battery 52 may produce a moment to pivot the saw unit 55 in the counterclockwise direction as viewed in FIG. 5. Therefore, the battery 52 may serve as a counterweight to the moment in the clockwise direction produced by the weight of the saw unit 55. As with the first representative embodiment, the saw unit 55 can be biased by the compression spring (not shown), so that the
10 saw unit 55 is held in the uppermost position with the aid of a stopper (not shown). Therefore, the moment produced by the battery 52 may serve to reliably hold the saw unit 55 in the uppermost position. As the operator pivots the saw unit 55 from the uppermost position to the lowermost position shown in FIG. 6, the moment applied by the battery 52 to the saw unit 55 in the counterclockwise direction gradually decreases to zero. Therefore, the moment of the
15 battery 52 does not act against the pressing force to be applied to the workpiece during the cutting operation.

In other words, the biasing force of the spring applied to the saw unit 55 may be reduced because the moment of the battery 52 assists in holding the saw unit 55 in the uppermost position. Thus, the spring may have a smaller spring constant, which will enable

the operator to pivot the saw unit 55 for the cutting operation more easily. Therefore, the cutting operation can be easily and smoothly performed with less strain on the operator.

The fifth representative embodiment of a table saw will now be described with reference to FIGS. 8 and 9, in which a battery case 64 is formed on a blade case 63 of a saw unit 62 on the opposite side to the motor 12. More specifically, the battery case 64 for mounting a battery 61 is disposed on one of the side surfaces of the blade case 63 on the opposite side to the motor 12 and is adjacent the pivotal axis 7. Also, positive and negative power source terminals 64a may be mounted on the bottom of the battery case 64 for connection to the motor drive circuit. In other respects, the construction of the saw unit 62 (in particular, the handle 47) may be the same as the saw unit 46 of the third representative embodiment.

With this arrangement, the battery 61 may be positioned on the side opposite to the motor 12 with respect to the blade case 63. Therefore, the battery 61 may serve as a counterweight against the weight of the motor 12 so as to provide a weight balance to the saw unit 62.

The sixth representative embodiment of a table saw will now be described with reference to FIGS. 10 and 11, in which a belt 72 connects the output shaft of a DC motor 73 to a saw blade 72. This is a principal difference between the table saw 70 and the table saws 1, 30, 45, 50 and 60 of the first to fifth representative embodiments, in which the saw blade 13

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

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to the upper surface of the table 74 or with the vertical support 83 pivoted relative to the table 74. Therefore, the table saw 70 may be improved in operability also in this respect.

Further, with the arrangement of the battery 82 between the motor 73 and the handle 81, the wiring operation of the motor drive circuit can be easily performed.

5 As a person of skill in the art will readily understand, the second to sixth representative embodiments may be modified in various way without departing from the invention.

For example, the battery cases 34, 41b, 53 and 64 of the second, third, fourth and fifth embodiments, respectively, may have discharge openings for discharging foreign particles or may have lids for preventing foreign particles from entering the battery cases.

10 In addition, although the present invention has been described in connection with two different types of table saws, one type of the first to fifth representative embodiments, and the other type of the sixth representative embodiment, the present invention may be applied to any kinds of table saws.

15 Further, the battery case or battery may be disposed at any position and is not limited to the locations disclosed in the representative embodiments. For example, the battery case may be disposed below the base of the table.

Furthermore, although the batteries in the above representative embodiments may be removed from the battery cases for the purpose of the charging operation or may be

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CLAIMS:

1. A table saw comprising:

a table for placing a workpiece thereon;

5 a saw unit vertically movably supported on said table and having a saw blade mounted thereon;

a battery-driven motor mounted on said saw unit for rotatably driving said saw blade; and

a battery mounting device for mounting a battery on the table saw.

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2. A table saw as defined in claim 1, wherein said saw unit has a handle operable by an operator for vertically moving said saw unit, and wherein said battery mounting device is disposed on said handle.

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3. A table saw as defined in claim 2, wherein said handle has a switch mounted thereon, which switch is operable by the operator to start said motor, wherein said battery mounting device is disposed adjacent to said switch.

4. A table saw as defined in claim 1 further including a base for supporting said table,

[illegible]

ABSTRACT OF THE DISCLOSURE

A table saw includes a table for placing a workpiece thereon. A saw unit may be vertically movably supported on the table and may have a saw blade mounted thereon. A battery-driven motor may be mounted on the saw unit for rotatably driving the saw blade. A battery mounting device may be provided for mounting a battery on the table saw.

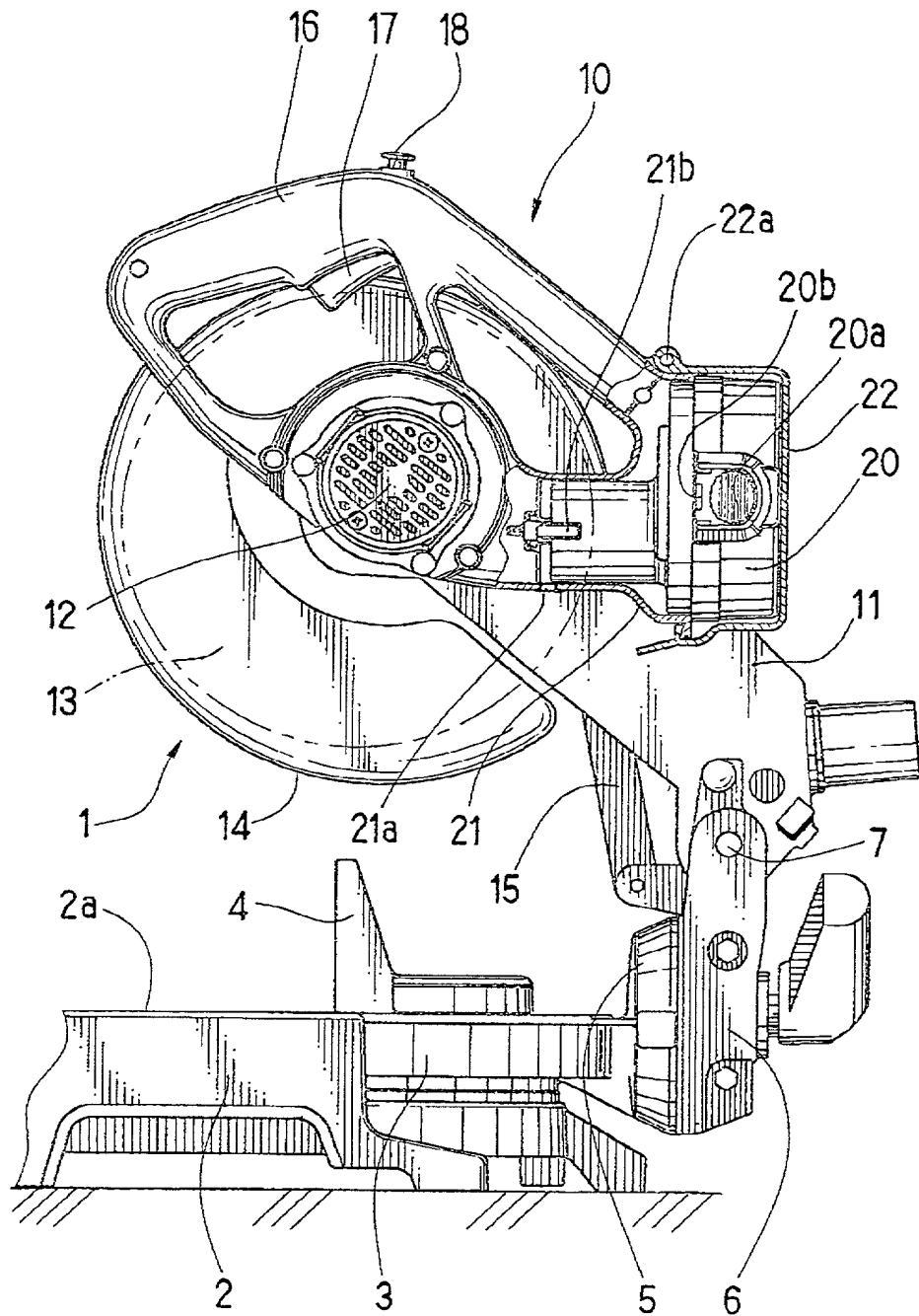


FIG.1

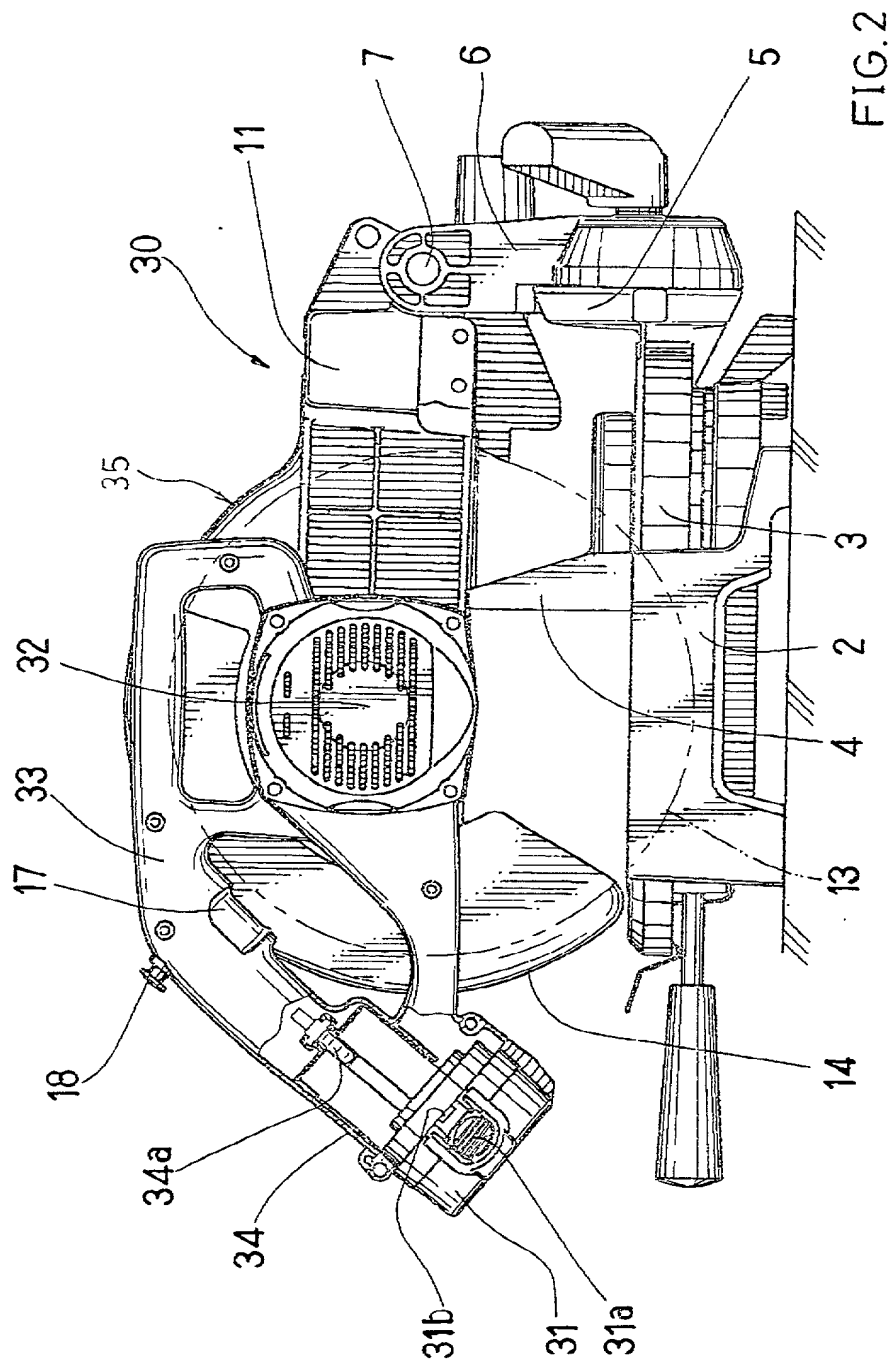


FIG. 2

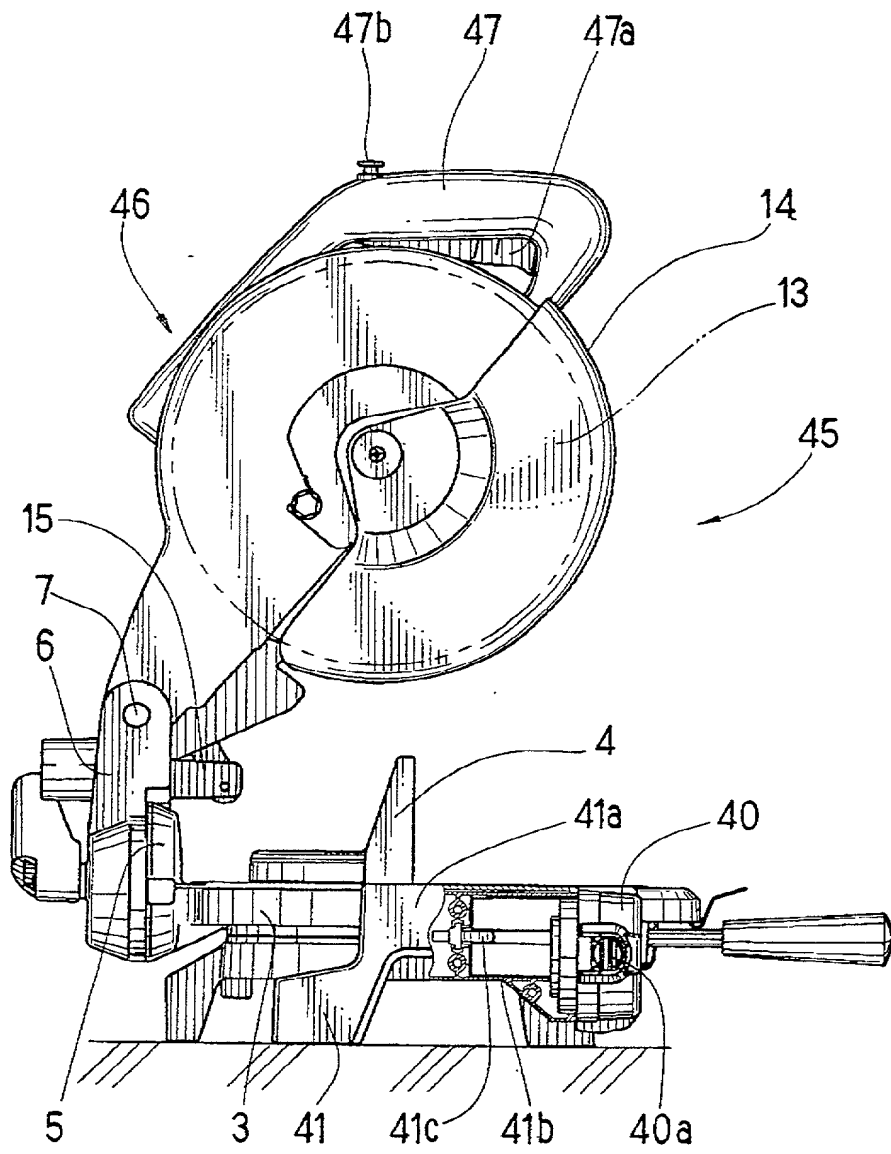


FIG. 3

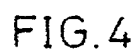






FIG. 6

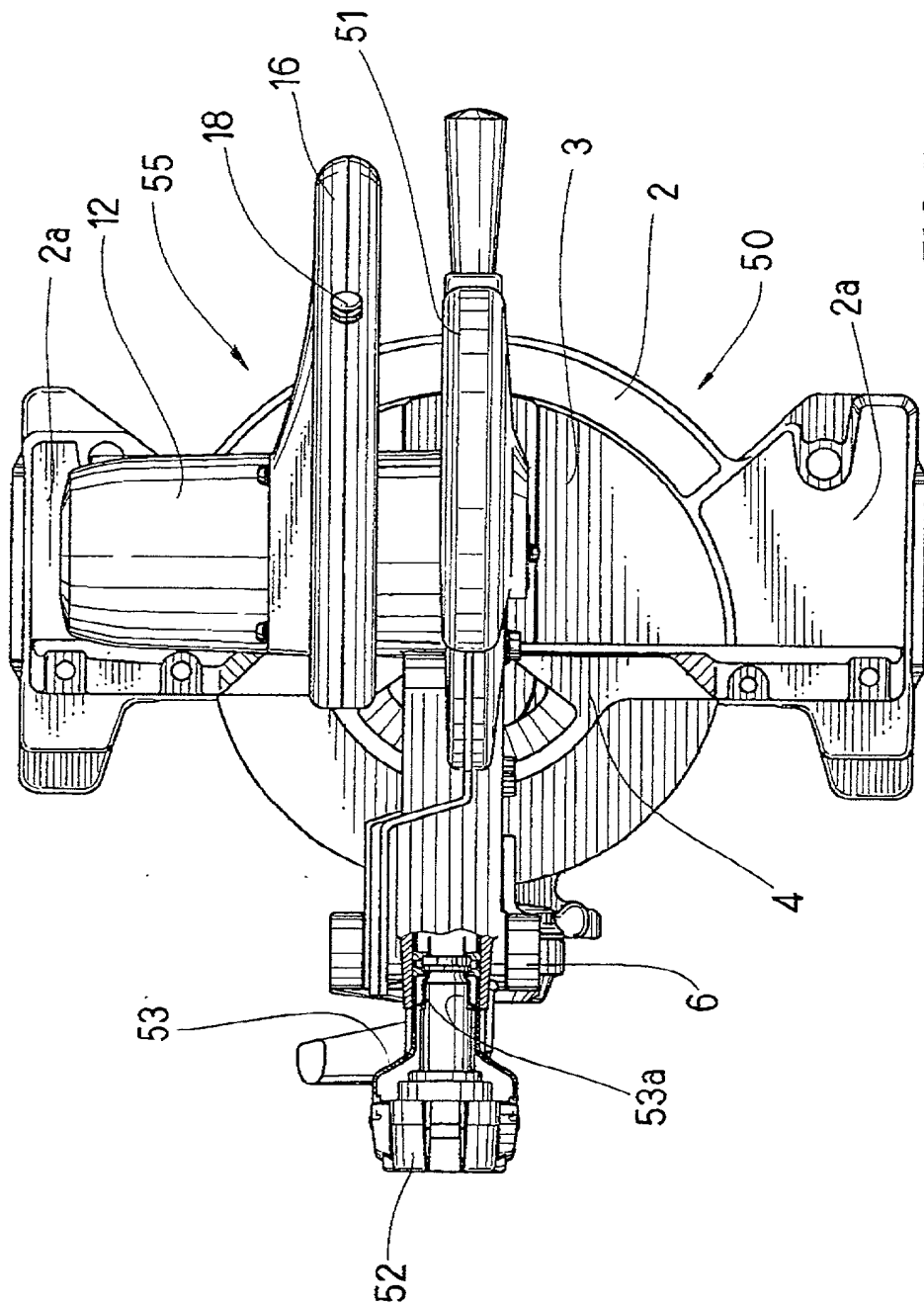
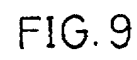


FIG.7





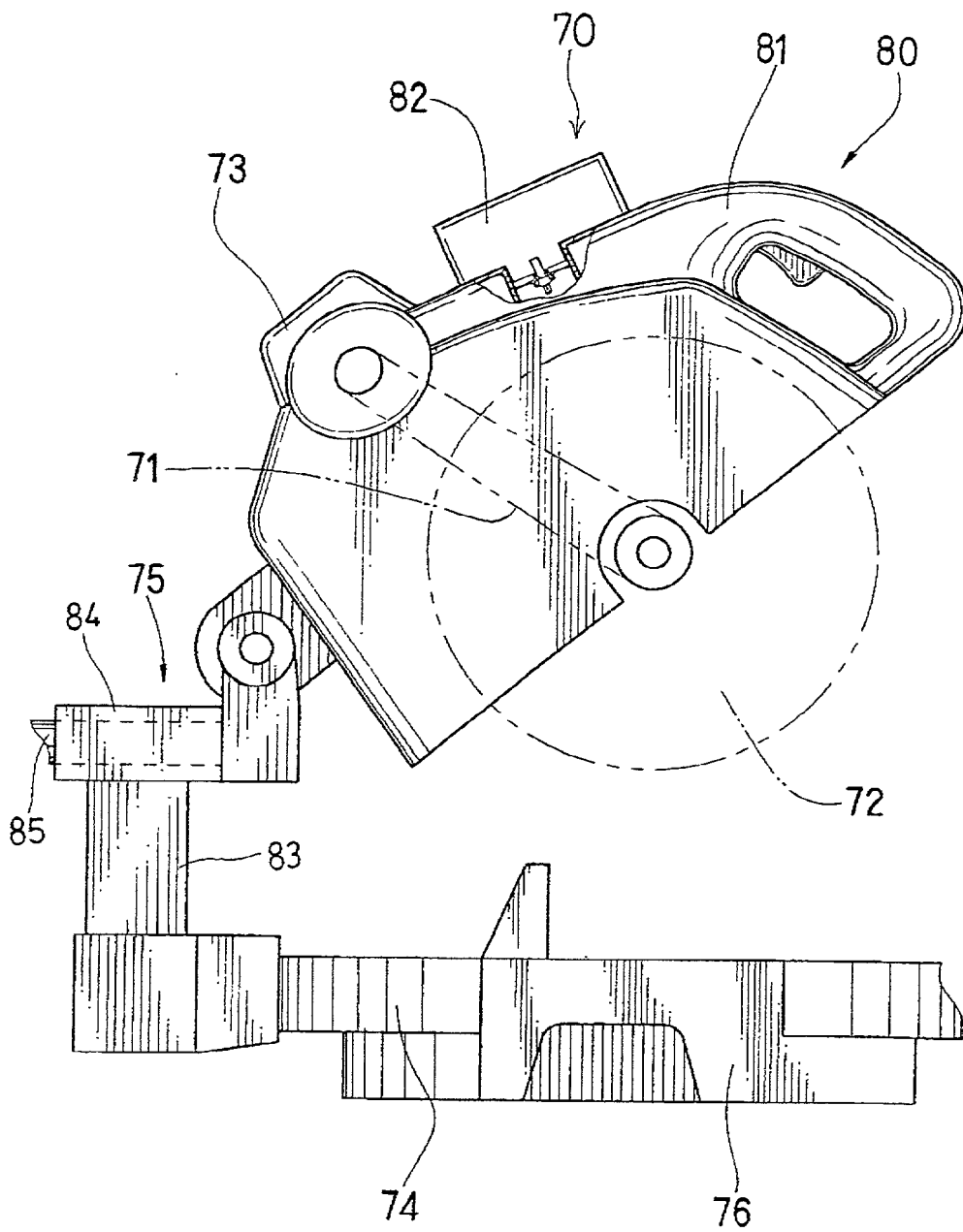


FIG.10

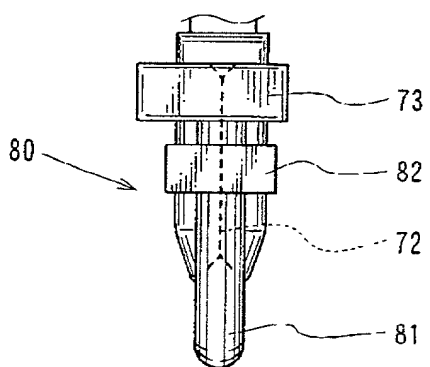


FIG.11

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Prior Foreign Application(s)
外国での先行出願

(Number)
(番号)

(Country)
(国名)

(Day/Month/Year Filed)
(出願年月日)

(Country)
(国名)

(Day/Month/Year Filed)
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(国名)

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(Day/Month/Year Filed)
(出願年月日)

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application (s) for patent or inventor's certificate, or Section 365(a) of any PCT international application which designated at least one country other than the United States, listed below and have also identified below, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Filing Date)
(出願日)

(Filing Date)
(出願日)

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I hereby claim the benefit under Tit application le 35, United States Code, Section 120 of any United States (s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States code Section 112, I acknowledge the duty to disclose Information which is material to Patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the Prior application and the national or PCT International filing date of application.

(Filing Date)
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(Status: Patented, Pending, Abandoned)
(現況: 特許許可済、係属中、放棄済)

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Japanese Language Declaration
(日本語宣誓書)

委任状：私は下記の発明者として、本出願に関する一切の手続きを米特許商標庁に対して遂行する弁理士または代理人として、下記の者を指名いたします。
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